Op/Ed

Positron emission tomography scanning for the early diagnosis of dementia

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Would improve quality of care for patients and save money

Dementia affects about 8% of people age 65 years and older.[1] About 4 million people in the US have Alzheimer's disease, the most common form of dementia in later life. The annual cost of this disease, including medical, home care, and taking into account the loss of productivity among caregivers, is estimated to approach $90 billion.[2] Although Medicare, Medical, and private insurance cover some direct costs, families assume the greatest expense.

Recognition of dementia is particularly difficult in its early stages when family members and physicians often incorrectly attribute the patient's symptoms to normal aging.[3] Systematic studies indicate that the frequency of unrecognized memory impairment, beyond that associated with normal aging, or dementia diagnosis can range from 50% to 90% of patients.[4] Thus, in some settings, physicians identify only 1 out of 10 people with dementia.

Neuroimaging studies are not used routinely to assist in diagnosis and differential diagnosis of dementia. Usually, clinicians obtain computed tomography or magnetic resonance imaging scans. Such structural neuroimaging studies are typically normal in-patients with organic dementias and have only limited usefulness, often providing nonspecific information about cerebral atrophy and rarely uncovering treatable lesions. In fact, the overinterpretation of structural imaging studies may contribute to overdiagnosis of vascular dementia.[1] By contrast, functional imaging – particularly positron emission tomography because of the biologic information it provides – can lead to a positive diagnosis of early Alzheimer's disease. In a study of patients with dementia who were followed clinically for at least 3 years, we found that baseline positron emission tomography scans showed greater diagnostic sensitivity and specificity than conventional clinical assessment.[5] With a prognostic sensitivity of greater than 90%, positron emission tomography was found to provide a diagnosis 2 to 3 years before manifestation of dementia-related symptoms.[5] Previous studies had also shown that the characteristic parietal/temporal lobe pattern of metabolic dysfunction observed on a positron emission tomography scan can be recognized months and sometimes years prior to clinical confirmation of Alzheimer's disease.[6]

Clearly, many patients with Alzheimer's disease are not recognized and fail to receive treatment, particularly early in the disease course when intervention is most effective.[1] Because of the loss of central cholinergic neurons that occurs in association with Alzheimer's disease, drug development has focused on improving cholinergic function. The U.S. Food and Drug Administration has already approved two drugs that improve cholinergic function, tacrine and donepezil. Multisite, placebo-controlled trials have shown that such cholinesterase inhibitors improve or delay decline in memory and other cognitive functions in patients with mild to moderate Alzheimer's disease.[1] Other therapies have shown efficacy. Vitamin E has been shown to delay functional decline[7] and antidepressant and antipsychotic medications to improve behavioral complications.[1]

Positron emission tomography is approved by the Food and Drug Administration and is reimbursed for many indications by private insurance providers, but the Health Care Financing Administration reimburses for only epilepsy, cardiovascular disease, melanoma, lymphoma, and lung and colorectal cancers. Although the Health Care Financing Administration is considering broad reimbursement policies for positron emission tomography, Medicare does not currently fund these scans for the differential diagnosis of dementia. But are we saving money by avoiding a procedure that improves early diagnostic accuracy? If, indeed, positron emission tomography increases diagnostic accuracy, particularly early in the disease course, how might these factors influence health care costs?

Patients would probably be treated earlier, with improved daily functioning and quality of life. Cholinesterase inhibitor treatment also delays nursing home placement.[8,9] In one study, the rate of nursing home placement in patients not receiving donepezil over a 6-month period was twice as high as that for patients receiving this drug.[9] In addition, non-pharmacologic interventions, such as caregiver education and emotional support, also delay nursing home placement.[10] Other economic studies indicate that use of donepezil by patients with mild to moderate Alzheimer's disease is associated with lower 5-year costs and slower progression to advanced stages when compared with usual care with no donepezil.[10] When uncertain about diagnosis, clinicians often perform costly repetitive examinations. The greater accuracy of positron emission tomography can facilitate early intervention. Offsetting the costs of anti-dementia medications would be the cost savings from delayed placement in nursing homes and the avoidance of repetitive examinations.

For a comprehensive analysis of health care costs, the economic outcomes of different approaches must be considered. In such an analysis, the costs of delay in diagnosis,

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patient and family preferences for second opinions, unpaid caregiver costs, or additional days in nursing homes also must be evaluated. An initial clinical assessment that includes a positron emission tomography scan (approximately $1200 for a brain scan) could save unnecessary repetitive tests (ranging from $500 to $2000 each) and delay in nursing home placement (about $40,000 per year).

Definitive diagnosis and treatment early in the course of the disease would likely decrease both direct and indirect costs. The improved diagnostic accuracy that positron emission tomography scanning provides argues for including such scans as part of the evaluation of dementia, particularly in patients with mild cognitive impairments.

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What's the primary care provider to do to diagnose and treat Alzheimer's disease?

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As the baby boomers enter the geriatric age group, the prevalence of dementia will rise dramatically and the cost of their care will be staggering. In the past decade, new drug treatments have garnered the attention of clinicians, family caregivers, and patients alike. Yet many primary care providers, and payers, remain skeptical about their benefits.

Dementia is one of the most stressful conditions that primary care providers must manage. Physicians are not likely to notice cognitive decline during a brief office visit without using cognitive screening tests. Physicians often view the assessment and treatment of dementia as time consuming, poorly reimbursed, and unlikely to much benefit the patient. As a result, dementia is often not diagnosed and physicians are reluctant to use standardized assessment tools. When dementia is diagnosed, physicians concentrate on the immediate medical concerns and neglect issues of long-term care and the needs of families and caregivers. Satisfaction with dementia care is often low; in one study, only 18% of caregivers thought they were given enough information about the disease.[1]

Guidelines for diagnosis of dementia recommend that neuroimaging should be considered when certain clinical features are present, such as localizing findings, or atypical presentations.[2,3] Similarly, the traditional extensive laboratory work-up has been questioned given that it is unlikely that conditions such as B_{12} deficiency or syphilis will be found in primary care settings.[4] A committee of the National Chronic Care Consortium and Alzheimer's Association has proposed a standardized set of screening and diagnostic studies that are most appropriate in managed care.[5] Even with these guidelines, however, dementia is currently a diagnosis made on the basis of clinical findings.

The lack of a diagnostic test has led Dr Small to recommend the use of positive emission tomography (PET) to allow for earlier diagnosis.[6] This recommendation is premature. First, no evidence exists that earlier diagnosis is associated with improved quality of life or cost savings. Second, while cholinesterase inhibitors show promise in the research setting, this promise has yet to be realized in actual practice.

The goal of early detection of disease is to provide